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N.B.—Articles, Reports, Notes, etc., against which authors are not indicated, have been prepared in the Directorate of Plant Protection, Quarantine and Storage of the Ministry of Agriculture, New Delhi. Any correspondence relating to these items should be addressed to the Plant Protection Adviser to the Government of India, New Delhi. Correspondence regarding other articles should be addressed to the writers concerned.

COVER ILLUSTRATION

The Swarming caterpillar of paddy (*Spodoptera mauritia* Boisduval).

NOTE

The object of this Bulletin is to present a factual and integrated picture of the plant pests and diseases situation in India and measures adopted to protect crops from their ravages. Any suggestions for the improvement of this Bulletin will be gratefully received.

HEM SINGH PRUTHI,

Plant Protection Adviser to the Government of India.

PLANT PROTECTION WORK IN INDIA DURING 1949-50

Protection of crops against pests and diseases is a regular practice in advanced countries, like the U.S.A., U.S.S.R., U.K., Canada, etc. In India, when we are fighting against serious food shortage, plant protection work must play a very important part in saving valuable food crops from being destroyed by plant pests and diseases. An account of plant protection work in India during *kharif* of 1949, was given in the last issue of the Plant Protection Bulletin. In this issue the progress of work during *rabi* (1949-50) and *kharif* (1950) is described. Operations carried over small areas (below 10 acres), have been omitted from the following account.

Ajmer

During 1949-50 winter there was heavy infestation by cutworms (*Agrotis*) over an area of 145 acres of wheat. While at some places the damage was not very heavy, at others, it almost completely ruined the crop. The infestation was more serious over 25 acres of low lying tank area, which was treated with 5 per cent BHC by mixing the poison with the soil along both sides of the germinating crop. The cost of the treatment including labour etc. was about Rs. 10|- per acre and the estimated gain was Rs. 60 per acre. *Laphygma exigua* infested about 20 acres of maize during summer. The pest was effectively controlled by dusting with BHC (5 per cent).

During *kharif* season, 1950, *Hieroglyphus nigrorepletus* severely attacked maize, jowar and bajra over an area of about 2,07,218 acres. In the cultivated area, the pest was effectively controlled over an area of 1,19,800 acres by dusting with BHC upto 10 per cent depending upon the stage of the pest. Similar control operations were undertaken in 2,000 acres of the uncultivated and 1,500 acres of forest areas and considerable reduction in the incidence of the pest was obtained. As a result of the operations in the cultivated area a total of 3,05,408 maunds of grains and 5,82,500 cart-toads of fodder valued at Rs. 24,43,264 and Rs. 82,00,000 respectively were saved.

About 10,500 maunds of barley, 3,000 maunds of wheat and 8,500 maunds of jowar seed were treated with Agrosan GN against seed-borne diseases. The barley and jowar crops thus raised were relatively free from smut.

Cumin plants were dusted with sulphur against the powdery mildew. Three hundred diseased guava trees were eradicated to prevent the spread of a newly recorded disease, probably of virus origin.

Assam

During October-December, 1949 the paddy crop was attacked by *Spodoptera mauritia* and *Cirphis* sp. in the districts of Lakhimpur, Goalpara, Nowgong and Kamrup. The total infested area was about 505 acres. Where the infestation was heavy the entire crop got destroyed. The pest was effectively controlled by spraying the crop with wettable DDT. The resultant saving was 2,298 maunds of paddy.

Rhopalosiphum pseudobrassicae was found infesting vegetable crops over an area of 46 acres. The pest was controlled by spraying with tobacco decoction and at other places 'Black-leaf-40' was used against this pest. As a result of this treatment 20 per cent increase in the yield was obtained.

Late-blight of potato was serious in certain areas and about 20 to 50 per cent loss was estimated. About 717 acres of the crop were sprayed with Bordeaux mixture or Dithane and the disease was completely controlled. As a result, an average increase in yield of about 25 maunds per acre was estimated.

The pulse crops, *Phaseolus radiatus* and *Phaseolus mungo* were affected with leaf spots due to *Cercospora cruenta* and *Colletotrichum lindemuthianum*. Spraying with Perenox was carried out on a large scale and an increased yield of about 1.5 maunds per acre was estimated.

Citrus trees were sprayed with Perenox against Canker, Scab and Wither-tip, and effective control was obtained. Zinc sulphate and lime mixture was sprayed against the zinc deficiency disease.

Colocasia blight (*Phytophthora colocasiae*) was serious in certain localities and was effectively controlled by spraying with Perenox.

Chillies were sprayed with Perenox against Fruit-rot (*Colletotrichum capsici*) with beneficial results.

Bihar

During 1949-50 winter, *Agrotis ypsilon* infested wheat, gram and lentil (masur) over an area of 1,250 acres in low-lying tracts of Patna, Monghyr and Bhagalpur districts. The pest was effectively controlled by dusting the crop with 3 per cent DDT or BHC. As a result of this about 90 per cent of the crop was saved from damage.

During *kharif* season 1950, *Hieroglyphus banian, Hispa armigera, Leptocorisa varicornis, Spodoptera mauritia* and *Nymphula depunctalis* infested paddy over an area of 500 acres. The damage by these pests varied between 10 and 60 per cent. The pests were controlled either by dusting with 5 per cent BHC or spraying with wettable DDT or with pyrethrum.

Paddy crop over an area of about 104 acres was treated against 'Dakhina', a physiological disease, with 60-70 per cent reduction in attack. Perenox was sprayed over a small area against *Helminthosporium oryzae* and the disease was considerably checked. Citrus trees and chillies were sprayed over small areas against Canker and Die-back.

Bombay

During autumn 1949 *Hieroglyphus banian* was found infesting paddy over an area of 23,000 acres. The pest was effectively controlled by dusting it with 5 per cent BHC at the rate of 15 to 20 lbs. per acre. During the same period *Colemania sphenarioides* also infested jowar and wheat over an area of 34,152 acres. The pest was controlled with 10 per cent BHC. Bagging the pest and dragging tarred tins over the infested crops were used as supplementary methods to dusting. At some places sodium-flousilicate bait was also used with success. As a result of these operations more than 80 per cent of the crop was saved.

During the monsoon season of 1950 there was heavy infestation of *Pyrilla* sp. on sugarcane over an area of 160 acres. The pest was controlled by dusting the crop with 5 per cent BHC. The crop was also cleared of borer-attacked shoots over an area of 525 acres and a considerable reduction in the population of borers was brought about.

During winter 1949-50 aphids infested cabbage and other cruciferous vegetable crops over an area of 235 acres. The pest was brought under control by spraying with tobacco decoction or fish oil rosin soap or dusting with 5 per cent BHC.

Wheat crop, over an area of 108 acres, was dusted with sulphur to prevent the spread of rust and the incidence of the disease was reduced by approximately 50 per cent. Paddy crop and nursery seedlings over 2,355 acres were sprayed with Bordeaux mixture (3:3:50) against blast *Piricularia oryzae*, resulting in an average reduction in attack by about 40 per cent.

Inter-culturing was adopted over an area of 600 acres of jowar against the 'kharya' disease due to *Sphacelia sorghi* with beneficial results.

Chillies, over an area of 2,725 acres, were treated with lime-sulphur and also sprayed with tobacco decoction against the 'murda' disease. As a result, the disease was reduced up to 90 per cent.

Cumin crop over small areas was dusted with sulphur against powdery mildew.

Coorg

During the period from June to November, the paddy crop was attacked by *Leptispa, Leptocorisa, Nymphula depunctalis* and *Nisaga* over an area of 1,919 acres. *Leptocorisa* and *Leptispa* were controlled by dusting with 5 per cent BHC. In the case of *Nymphula,* plants were shaken and the larvae dislodged into the standing water of the fields which was previously covered with kerosene. *Nisaga* was controlled by spraying with DDT (strength not stated).

About 97 tons of paddy seed were treated with Agrosan GN against foot-rot and seedling blight, and spraying in nursery beds was done against blast (*Piricularia oryzae*). Citrus trees over an area of about 2,400 acres

were sprayed with Bordeaux mixture or treated with Bordeaux paste or sulphur dust against leaf-fall and fruit-rot, gummosis, and powdery mildew.

Coffee plantations over 2,386 acres were sprayed with Bordeaux mixture against leaf-rot.

About 10,000 Cardamom seedlings were sprayed with Bordeaux mixture against damping-off, and 2,016 acres of rubber against fungus diseases.

Arecanuts were sprayed with Bordeaux mixture against 'mahali' disease (*Phytophthora arecae*) over a few acres.

Delhi

Since the Plant Protection Organization of the State is not yet fully equipped, the Central Directorate of Plant Protection, Quarantine and Storage gives necessary assistance in the pest control work. During winter 1949-50 and spring 1950, aphids infesting vegetables like cabbage, cauliflower, radish, cucurbits over an area of 48 acres were controlled by spraying with pyrethrum. As a result of this treatment 90 per cent reduction in the pest was obtained. *Aulacophora foveicollis* which infested about 46 acres of cucurbits was controlled by dusting with pyrethrum. During September, 1950 heavy infestation of 'bhindi' by *Empoasca devastans* was noticed over an area of 16 acres. The pest was controlled by spraying with pyrethrum (Pyro-colloid 1 : 800).

During the period August to October, 1950, *Galerucella birmanica* infested the crop over an area of about 200 acres. The pest was effectively controlled by dusting with 5 per cent BHC. Similarly, *Hieroglyphus nigrorepletus* infesting the jowar crop over an area of about 40 acres during July to September, 1950, was brought under effective control by dusting with 5 to 10 per cent BHC depending upon the stage of the pest.

Field rats damaging crop in the villages were destroyed by baiting them in 25,745 burrows with Strychnine hydrochloride bait.

About 4,000 maunds of jowar and 1,665 maunds of wheat seeds were treated with Agrosan GN against smut and foot-rot, respectively. Nearly 1,800 citrus trees and 59,627 nursery plants were sprayed with Perenox against Canker and Die-back. Eradication of the wild popy weed was carried out over an area of 4,385 acres.

Hyderabad

During March to October, 1950, the paddy crop was infested with *Hispa armigera* over an area of 653 acres, and with *Nymphula depunctalis*, *Spodoptera mauritia*, *Pachydiplosis oryzae*, *Schoenobius* sp. and *Thrips oryzae* over an area of 90 acres. *Hispa*, *Spodoptera* and *Nymphula* pests were controlled by dusting the crop with 5 per cent BHC. Further infestation by *Schoenobius* and *Pachydiplosis* was prevented by removing the 'dead-hearts' and using light traps for attracting the adults. *Thrips oryzae* was controlled by spraying tobacco decoction or nicotine sulphate.

During July 1950, *Aphis laburni* infested groundnut over an area of 57 acres. It was controlled effectively by spraying with ordinary tobacco decoction, nicotine sulphate or fish oil rosin soap or dusting with 5 per cent BHC depending upon the seriousness of the infestation. Had these measures not been taken about 50 per cent of the crop would have been lost.

During October 1950 *Achaea janata* infested the castor crop over an area of 73 acres and the pest was controlled by spraying with lead arsenite at the rate of 1½ oz. per gallon. As a result of this treatment 30 per cent of the crop was saved.

About 28 maunds of paddy and 6 maunds of wheat seeds were treated with Agrosan GN against the seed-borne diseases. Nearly 27 acres of paddy were treated against blast (*Piricularia oryzae*) and culm-rot (*Helminthosporium sigmoideum*). Wheat crop over an area of about 10 acres was dusted with sulphur against rust.

About 260 citrus trees were sprayed with Perenox against Canker and Die-back, and with zinc sulphate and lime mixture against Chlorosis. Control measures were also undertaken against the sudden wilt, *viz.* root-pruning, application of Bordeaux paste, manuring and the improving of drainage. Two hundred mango trees were dusted with sulphur against the powdery mildew, *Oidium mangiferae*, and 61 trees were treated with Bordeaux paste against Gummosis. Twenty-two fig plants were dusted with sulphur against rust, *Cerotelium fici*.

Eradication of sugarcane Smut and 'Striga' was carried out in a few acres.

Turmeric crop, about 13 acres, was sprayed with Bordeaux mixture against leaf-spot, *Colletotrichum curcumae*.

Suitable control measures, over small areas, were adopted against the wilt of tomatoes and cluster beans,. Damping-off of tobacco, cotton Anthracnose, grape-vine Mildew and the virus disease of lady's finger.

Madhya Pradesh

During the period July to September, 1950, the paddy crop was infested with *Hieroglyphus banian* over an area of 600 acres, with *Leptocorisa varicornis* over an area of about 10 acres and *Hispa armigera* over an area of 5 acres. These pests were effectively controlled by dusting with 5 per cent BHC.

During August, 1950, thrips heavily infested chillies over an area of 50 acres. The pest was controlled either by spraying with fish oil rosin soap, tobacco decoction, DDT or by dusting with 5 per cent BHC.

During August, 1950, mites causing curling of chilli leaves (*Churda murda*), over an area of 250 acres, were controlled by spraying with fish-oil rosin soap or tobacco decoction.

Aulacophora foveicollis infesting cucurbits and *Prodenia litura* infesting cauliflower over an area of about 14 acres were controlled by spraying the crop with lead arsenite or DDT. Similarly, jassids and thrips which infested the onion crop over an area of 17 acres were controlled by dusting with 5 per cent BHC or spraying with DDT or fish oil rosin soap.

Effective control of *Indarbela* was also achieved by treating the tunnels with ethylene dichloride and carbon tetrachloride mixture on about 1,700 citrus plants.

About 1,000 field rat burrows infesting standing crops and stores were successfully treated with 5 per cent zinc phosphide bait.

Sorghum seed, to sow about 73,320 acres, and cotton seed to cover nearly 4,140 acres, were treated with copper carbonate dust or Agrosan GN against smut and seedling blight, respectively, and a gain of Re. 1 to Rs. 2 per acre was estimated. Over 2,300 orange trees and young plants were sprayed with Bordeaux mixture or treated with Bordeaux paste against Die-back, Canker, and Gummosis. Forty mango trees were dusted with sulphur against Powdery mildew. Betel-vines were sprayed with Bordeaux mixture to control Wilt and Foot-rot. Control measures were also undertaken, over small areas against Colocasia Blight, chilli Anthracnose, pumpkin Powdery mildew and Foot-rot of wheat.

Madras

During the period July to March (1949-50), the two paddy crops viz. *Samba* and *Khar* were infested with *Leptocorisa varicornis, Nymphula depunctalis, Leptispa, Hispa armigera* and *Spodoptera mauritia* over an area of 11,305 acres. The pests were effectively controlled by dusting with 5—10 per cent BHC depending upon the stage and the seriousness of the pests or by spraying with DDT.

Between July and October, 1950, *Hieroglyphus banian* and *Oxya velox* infested paddy over an area of 2,107 acres. They were controlled by dusting with 5 to 10 per cent BHC at the rate of 20 lbs. per acre depending upon the stage of the pest. As a result of this treatment about 300 tons of paddy were saved.

Between January and March, 1950, *Nephotettix* infested the crop over an area of 1,540 acres and effective control was obtained by dusting the crop with 5 per cent DDT or DDT mixed with pyrethrum at the rate of 15 lbs. per acre. In other places DDT spray was also used with success. As a result of this treatment a saving of about 186 tons of paddy was obtained. Successful control measures were also carried out against pests *Cnapholocrocis medinalis, Pachydiplosis oryzae, Parnara mathias, Cirphis* sp. etc. infesting paddy over an area of 1,708 acres by dusting with BHC or spraying with DDT.

Between January and August 1950 ragi crop was found infested with *Laphygma exigua* over an area of 347 acres. The pest was brought under control by dusting with 5 per cent BHC or DDT. Spraying with lead arsenate was also adopted. An estimated gain of 82 tons of ragi was

obtained. Between April and June the same crop was attacked by *Calocoris angustatus* over an area of 221 acres. Dusting with 10 per cent BHC gave an effective control and the resultant gain was about 30 tons of ragi. Thrips, *Aelopus* sp. and aphids also infested ragi over an area of 94 acres. These pests were brought under control by spraying with DDT or dusting with 5 per cent BHC at the rate of 15 to 20 lbs. per acre. It was estimated that a gain of 13 tons of ragi was obtained. During September, *Chrotogonus* and *Aelopus* infested millets over an area of 963 acres. They were effectively controlled by dusting the crop with 5 per cent BHC. A resultant saving of 137 tons of the millets was obtained.

During January, 1950, *Heliothis armigera* was found infesting pulse crops over an area of 20 acres. Dusting with 5 per cent DDT was successful, giving an increased yield of about 5 tons.

Nearly 2,000 maunds of potato tubers were treated with 5 per cent BHC and DDT against *Gnorimoschema operculella*. During April to October, 1950 *Euxoa segetum* infested about 50 acres of the potato crop. The pest was controlled by dusting the crop with 5 per cent DDT alone or mixed with pyrethrum at the rate of 20 to 40 lbs. per acre. As a result of this about 14 tons of the tubers were saved from damage.

During January to October, 1950 *Epilachna* sp. infested brinjal over an area of 1,082 acres. The pest was effectively controlled by dusting the crop with calcium arsenate and ash. About 108 tons of the crop was saved. From January to October 1950, aphids infesting cruciferous plants such as cabbage over an area of 36 acres were controlled with fish oil rosin soap. This treatment brought about a gain of nearly 9 tons. During June and August, 1950 the brinjal crop was infested with *Urentius echinus* over an area of 732 acres. It was controlled by spraying with BHC or DDT. The resultant saving was about 28 tons of the crop. During spring and summer months, 110 acres of young cruciferous plants were found infested with *Helula undalis, Plutella maculipennis, Euxoa segetum, Agrotis* sp. and *Bagrada picta*. The crop was dusted with 5 per cent DDT or BHC and a saving of 63 tons of the crop was brought about. Young cucurbit plants over an area of about 12 acres were infested with *Aulacophora* sp. Spraying the crop with lead arsenate gave a complete kill.

Rats damaging paddy over an area of 7,170 acres, gram over an area of 55 acres, potato over an area of 38 acres and vegetable crops over an area of 15 acres were killed by baiting them with zinc phosphide (5 per cent). Four tons of gram and nearly 50 tons of potato tubers were saved.

Paddy seed to sow about 53.782 acres, was treated with Agrosan GN against foot-rot (*Fusarium moniliforme*) and Helminthosporium disease. About 278 acres of nursery seedlings were sprayed with Bordeaux mixture against Blast (*Piricularia oryzae*), and seeds of blast resistant strains of Co. 25 and Co. 26 were supplied to the cultivators. As a result of these measures, an increased yield of about 4,044 tons of paddy was estimated.

Sorghum seed to cover about 2,47,289 acres, and Italian millet seed to sow 16,300 acres, were treated with sulphur dust or Agrosan GN to control smuts. An additional yield of about 1,467 tons of millets was thereby expected.

Eradication of smutted ears and 'Striga' was carried out over 26 acres of the sorghum crop. Nearly 275 acres of ragi (*Eleusine coracana*) nursery were sprayed with Bordeaux mixture against Blast, resulting in a saving of about 7 tons of grain.

About 53 acres of the potato crop was sprayed with Bordeaux mixture to prevent early-blight (*Alternaria solani*) with an estimated increase in yield of about 14 tons of potato.

Eradication of smutted shoots of sugarcane and the selection of healthy setts for seed purposes against Red rot, were carried out over an area of 145 acres.

Several thousand citrus trees were sprayed with Bordeaux mixture to control Leaf-fall, Fruit rot, and Canker, and with Zinc sulphate—lime mixture to control foliocellosis, with an estimated gain of about 645 tons of fruit.

Over 4,500 mango trees were treated against Pink disease, Withertip, Fruit-fall and Mildew.

Panama disease of banana (*Fusarium oxysporum cubense*) was eradicated over an area of 52 acres.

Arecanuts, over 1,40,200 trees, were sprayed with Bordeaux mixture, against 'mahali' disease (*Phytophthora arecae*). Coconuts, over an area of about 100 acres were treated against the Stem-bleeding disease (*Ceratostomella paradoxa*), Bud-rot (*Phytophthora palmivora*) and Leaf spot.

Grape vines, over 127 acres, were sprayed with Bordeaux mixture or treated with sulphur dust to control the Downy and Powdery mildews.

About 560 acres of turmeric crop and about 659 acres of chillies were treated against the Leaf spot of turmeric and the Fruit-rot and Damping-off of chillies. An additional yield of about 1,600 lbs. of turmeric and about 12 tons of chillies was thereby expected.

Mysore

About 30 acres of the wheat crop, affected by rust, were destroyed and the rest of the crop was protected by sulphur dusting. Besides, nearly 100 acres of the unauthorised wheat crop, raised during the prohibited period, April to September, was destroyed for the control of wheat and barley rusts.

Coconuts and arecanuts were treated against the 'anabe roga' (*Ganoderma lucidum*), and apple trees against the Mildew.

Orissa

During January-February, 1950, young paddy was found infested with *Spodoptera mauritia, Nymphula depunctalis* and *Hispa armigera.* During July 1950 onwards the crop was attacked by *Hieroglyphus banian* and continued through summer and autumn months. During August

Leptocorisa, Cirphis and Jassids were also present. The total infested area was about 3,000 acres in different districts. The crop was dusted with 5 per cent BHC bringing down the incidence of the pests to a considerable extent. As a result of this treatment about 6,000 maunds of extra paddy were obtained. About 850 maunds of paddy seed were treated with chlordane 3-A against stored grain pests. About 90 maunds of the seed-grain were saved.

During winter 1949-50, the potato crop was infested by *Epilachna* and cut worms over an area of 704 acres. These pests were controlled by spraying the crop with DDT. The estimated gain was about 8,370 maunds of tubers. About 1,500 maunds of potato tubers were treated with 10 per cent DDT at the rate of 2-3 oz. per maund of tubers as a protection against *Gnorimoschema operculella.*

About 500 maunds of rice were fumigated with ethylene dichloride and carbon tetrachloride mixture (1 : 3) at the rate of 15 lb. per 1000 c.ft. against *Corcyra cephalonica.* As a result of this treatment about 30 mds. of rice were saved from being destroyed. About 2,000 maunds of pulses infested with pulse beetles were similarly treated with ethylene dichloride and carbon tetrachloride mixture.

About 2,060 maunds of paddy seed were treated with Agrosan GN against seed-borne diseases.

Potato crop affected with Early blight, was sprayed with Dithane over an area of about 115 acres. An increase in yield of about 1,030 maunds of potato was estimated. Eradication of virus affected potato plants was carried out over an area of about 100 acres.

Tomato crop was affected with virus diseases and wilt, and about 10-15 per cent loss was estimated. The eradication of affected plants was carried out over an area of about 48 acres to prevent the spread of the diseases.

Citrus trees over a few acres were sprayed with Perenox against Canker and Die-back.

Punjab

During November, 1949, wheat crop over an area of 88 acres was infested with *Chrotogonus.* The pest was controlled by dusting with 5 per cent BHC. Similarly, during summer 1950, cotton crop was severely attacked by *Chrotogonus* over an area of 118 acres. The pest was controlled by dusting 5 per cent DDT.

During August-September, 1950, paddy was infested with *Hispa armigera* over an area of 390 acres, with *Leptocorisa varicornis* over an area of 28 acres and *Hieroglyphus* over an area of 370 acres. These pests were effectively controlled by dusting with 7-10 per cent BHC.

During the summer of 1950, further multiplication of top borer and stem borer in sugarcane was checked over an area of 345 acres by pulling out the dead-hearts and killing the larvae. *Pyrilla* sp. was infesting

sugarcane over an area of 55 acres. It was controlled by spraying wettable BHC. About 23,500 apple trees were treated with diesel oil emulsion against San Jose Scale and 148 trees with nicotine sulphate against woolly aphis. The holes caused by the apple stem borer in about 1,200 trees were treated with potassium cyanide with effective results. About 11,000 trees infested with *Diphorina citri* and 2,500 plants attacked by citrus white fly were sprayed with DDT. During the summer 1950, about 900 citrus plants were infested with *Papilio demoleus*. They were treated by dusting with 5 per cent BHC. During the spring 1950, *Idiocerus* infesting about 1,364 mango trees and the *Drosicha stebbingi* infesting about 370 trees were controlled by spraying the trees with DDT (0.15 per cent concentration) and by banding the trunks with sticky bands respectively. During September-October, 1950, *Galerucella birmanica* infested the crop over an area of 43 acres. The pest was effectively controlled by dusting the crop with 5 per cent BHC.

About 275 maunds of jowar seed and 6,500 maunds of wheat seed were mixed with 4 per cent BHC at the rate of 1 lb. per 1,000 cu. ft. as a protection against store pests. About 1,500 maunds of potato tubers were similarly treated with 5 per cent DDT as a protection against *Gnorimoschema operculella*.

About 3,500 jackals were killed by using strychnine hydrochloride bait. Mutton was used as a carrier base.

About 10 maunds of barley seed were treated against the Loose-smut (*Ustilago nudo*).

About 20,000 citrus trees and 15,000 nursery plants were sprayed with Bordeaux mixture as a preventive measure against Canker and Wither-tip. The results were very encouraging, and in some cases the disease was reduced by 80—98 per cent.

About 500 peach trees were sprayed with Bordeaux mixture or Perenox against Leaf-curl (*Taphrina deformans*), and over 3,250 apple trees against various fungus diseases.

The tomato and potato crops were sprayed over small areas against blights.

Union of Travancore and Cochin

Paddy crop infested with *Nymphula depunctalis* and *Schoenobius bipunctifer* over an area of 4,000 acres, was partly dusted with 5 per cent BHC and partly sprayed with DDT (0.16 per cent concentration). These operations reduced the incidence of the pest by 90 per cent. (Further details are awaited). Incidence of *Nephantis serinopa* damaging coconut leaves was considerably reduced by the release of *Eulophid* parasites in large numbers.

Hispa armigera attack was reduced by 95 per cent over an area of 750 acres by dusting with 5 per cent BHC or spraying with DDT.

Mr. W. Wilson Mayne reports that cabbage plants in the vegetable gardens at Munar in the high ranges of Travancore were found to be

heavily attacked by club-root due to *Plasmodiophora brassicae*. The disease had not been reported from Travancore before. Affected plants were, he writes, uprooted and soil was limed with a view to controlling the disease.

Uttar Pradesh

During the autumn 1950, *Hieroglyphus* was found causing considerable damage to sugarcane over an area of 586 acres. The incidence of the pest was considerably reduced by the use of standard sodium fluosilicate bait. During the same period the crop was also infested with Pyrilla spp. The crop was dusted with 2½ per cent BHC. As a result of this treatment, the incidence of the pest was brought down by 90 per cent. During the same period, paddy was infested with *Spodoptera mauritia* over an area of 17 acres with *Hieroglyphus* sp. over an area of 670 acres and with *Leptocorisa varicornis*. over an area of 144 acres. These pests were controlled by dusting the crop with 5 per cent BHC.

Jowar crop was attacked by *Amsacta* sp. over an area of 82 acres and by *Hieroglyphus* sp. over an area of 70 acres. These pests were treated with 5 per cent BHC and the incidence was reduced by 80 per cent.

Moong (*Phaseolus radiatus*) was attacked by *Chrotogonus* sp. over an area of 70 acres. The pest was effectively controlled by dusting the crop with 5 per cent BHC.

Vegetable crops like brinjals and cucurbits were attacked by *Epilachna* sp. and *Aulacophora* sp. over an area of 60 acres and 56 acres respectively. *Epilachna* was controlled by dusting with 2½ per cent BHC. *Aulacophora* beetle was controlled by dusting the crop with 5 per cent BHC or spraying with DDT. At some places pyrethrum dust was also used effectively. Sodium fluosilicate mixed with ash (1:8) was also used with effective results.

During autumn of 1949 and of 1950, in the hill districts citrus plants were infested with *Aleurocanthus* sp. and *Diphorina citri*, which were controlled by spraying 1,775 trees with lime sulphur solution mixed with water at the rate of 1:30 or with DDT (0.16 per cent concentration). About 17 trees were treated against black aphis by spraying with tobacco decoction and 55 trees against black aphis were treated with DDT (0.2 per cent concentration). On 100 other plants black aphids were controlled effectively by spraying with fish oil rosin soap mixed with water (1:32). About 1,000 seedlings of citrus and 55 citrus plants were infested with *Papilio demoleus* Lin. They were dusted with BHC. (5 per cent). During July about 200 peach trees over an area of 390 acres were infested with aphids. The pest was controlled by dusting with 5 per cent BHC.

During winter 1949-50 *Drosicha stebbingi* infested 1,231 mango trees. The pest was controlled by the use of sticky bands. At the same time about 3,000 apple trees were sprayed with fish oil rosin soap mixed with water (1:32) against *Eriosoma lanigerum* Haus. The incidence of the pest was reduced by 80 per cent. During the winter 1949, 550 trees infested with

San Jose Scale were sprayed with diesel oil and soap emulsion diluted 6 times with water. During the spring and summer 1950 large scale measures were organised against the *Idiocerus* infesting 35,260 trees. They were sprayed with 0.25 per cent of DDT emulsion and the incidence of pest was reduced by 90 per cent. At the same time 260 seedlings infested with scale insects were treated with lime sulphur effectively. During the autumn 1950, *Zeuzera* sp. was controlled by fumigating the borer holes with a mixture of chloroform and creosote oil (2:1) in 102 trees. During the winter 1950, about 230 jack fruit trees were infested with *Indarbela* sp. The borers in holes were reduced by 60 per cent by injecting 16 per cent DDT emulsion in holes followed by spraying the trees with 0.5 per cent DDT emulsion. About 642 trees were infested with *Drosicha stebbingi* towards the beginning of spring of 1950. The incidence was considerably reduced by the use of sticky bands (rosin and castor oil in equal parts).

About 5,000 maunds of seedgrains, *viz.* wheat, barley, *urid, bajra,* etc. were mixed with 10 per cent DDT dust as a protective measure against stored grain pests. About 500 seed godowns were also treated with 5 per cent BHC.

Rats infesting various crops were destroyed by fumigating about 25,000 burrows with Cyanogas.

About 870 maunds of paddy, 138 maunds of wheat, 90 maunds of barley and 672 maunds of sorghum were treated with Agrosan GN against seed-borne diseases.

The potato crop was sprayed over an area of about 150 acres with Bordeaux mixture, or with Perenox, against early and late blights. Further spread of the disease was checked. Roguing of virus-affected plants and the spraying of DDT, 0.1 per cent, to keep down the insect vectors were carried out over an area of about 15 acres.

Over 12,000 apple trees affected with stem-black (*Coniothecium chmatosporum*), stem-brown (*Botryosphaeria ribis*). Pink disease (*Coticium salmonicolor*) or Collar-rot (*Rosellinia* sp.) were treated with Chaubattia paste (Red oxide of lead—4 parts, Copper carbonate—4 parts, and Lanoline—5 parts), and over 1,160 trees and seedlings were dusted with sulphur against powdery mildew (*Podosphaera leucotricha*). About 4,300 trees were sprayed with Sodium hydroxide (3 lbs. in 20 gallons water) against Lichens and complete control was obtained.

Over 2,360 trees and 4,963 seedlings of mango and about 3,000 trees and 4,500 seedlings of citrus were sprayed with Bordeaux mixture or Perenox against Die-back and Canker diseases. Three hundred guava trees were sprayed with Perenox against mummy disease.

About 84 peach trees were treated against the leaf-curl disease, 88 plum trees against collar-rot and powdery mildew, and about 4,205 papaya trees and seedlings against virus disease and anthracnose.

West Bengal

During 1949-50, potato crop was infested with *Agrotis* over an area of 14,000 acres. The crop was sprayed with 5 per cent DDT. During monsoon and autumn 1950, *Spodoptera, Leptocorisa* and *Hispa* severely attacked paddy over an area of 17,300 acres. They were effectively controlled by dusting the crop with 5 per cent BHC. About 73,000 maunds of potato tubers were mixed partly with 10 per cent DDT and partly with 5 per cent BHC as a protection against *Gnorimoschema operculella.*

During spring 1950, 500 mango trees infested with *Idiocerus* were treated with DDT (0.16 per cent concentration). As a result of this 25,000 fruits were recovered.

During the monsoon 1950, jute was found infested with *Diacrisia obliqua* and *Cosmophila sabulifera* over an area of about 2,700 acres. The pest was controlled by dusting with 5 per cent BHC.

About 13,477 maunds of paddy seed were treated with Agrosan GN against *Helminthosporium oryzae.*

The potato crop over an area of about 29,305 acres was sprayed with Dithane or Perenox against late and early blights and a gain of about 10 per cent in yield was estimated. Eradication of diseased plants and the spraying of 0.1 per cent DDT were carried out over an area of about 2,250 acres of potato to prevent the spread of virus diseases.

Control measures were taken against the black-rot of cabbage and the damping-off of vegetables over an area of about 1,310 acres.

LOCUST SITUATION AND PROGRESS OF CONTROL CAMPAIGN IN INDIA DURING 1950

Swarm invasion and movements during summer :

No swarm over-wintered in India during 1949-50 and up to the end of April the population of scattered locusts was also low. However, the locust population began to show an increase during May and on 11th of that month a swarm came into Rajasthan. About a dozen more swarms followed before the end of May, about a dozen in June and half a dozen in July. The swarms entered over a large front, about 700 miles, along the North-western border of India extending through the Punjab, PEPSU, Rajasthan, Kutch, Saurashtra, Tharad etc.

The majority of swarms received during May were immature (pink or grey in colour), but the number of yellow swarms was larger among those which came in June and still larger (about 70 per cent.) in July. The swarms were very active and they immediately reached several parts of the U.P., Bihar, Madhya Bharat, Vindhya Pradesh, Madhya Pradesh, Kutch, Saurashtra and northern parts of Bombay State etc.

One of the main conclusions of the Conference held at Karachi last year was that the Oman region in Eastern Arabia was of crucial importance so far as Iran, Pakistan and India were concerned and that any control campaign carried out there would greatly reduce the threat of invasion to these countries in the spring and summer. Fortunately, no gregarious breeding took place in Oman : breeding in Iran was not heavy and control campaign in Pakistan was reported to be completely successful. However, the number of swarms which came into India was surprisingly much larger than we expected. In fact the size of the invasion was thus much larger than that noted at this stage (2nd year) of at least the two previous cycles when reliable observations were taken.

With the advance of monsoon in the western direction the swarms started moving out of Bihar and U.P. etc. Bihar was clear early in July and by the end of that month only a few swarms remained in the U.P. (western districts). Thus the swarms got mostly concentrated in Rajasthan particularly its eastern regions, and in the adjoining districts of the Punjab, PEPSU, etc.

Monsoon Breeding :

Northern India received only a small amount of rainfall during May-June. Locust breeding was noted for the first time in the season in one or two villages of Bhatinda district, in the second fortnight of June over a gross area of about 25 acres. Control measures were taken but a few scattered hoppers escaped destruction and became adults in the first week of July. These adults on account of their small number did not form any swarm and got mixed with the foreign swarms which were present in this region at that time.

The first heavy showers of the monsoon were received on 7th July over large areas of Rajasthan and the adjoining districts of other states. The majority of swarms present in India at that time were mature and egg-laying started about the 14th of July. Hoppers emerged over large areas about the 25th of July in several parts of Rajasthan particularly the Bikaner Division, adjoining districts of Jaipur and the eastern districts of Jodhpur Division. The main emergence of hoppers, however, took place in the first fortnight of August over still bigger tracts including Jaisalmer and other Western districts. By the middle of August, almost the whole of Rajasthan and some parts of the adjoining districts of Punjab were infested with hoppers, the gross area being over 50,000 square miles Then the extent of emergence steadily declined and petered out in the first fortnight of September.

A complete record was kept of tracts where swarms had been found resting or laying eggs and control operations were started as soon as hopper emergence was noted. Therefore, it was possible to destroy a vast majority of hoppers before they passed the third stage. However, in some localities, control operations had to be carried out against advanced stage hoppers and even freshly fledged individuals. The small percentage of hoppers which escaped detection or destruction, started fledging about the 20th of August in Eastern Rajasthan. They collected together and formed 5 or 6 small swarms or swarmlets in the last week of August and in the first half of September of which three were destroyed when they were found resting in the cooler hours of the day. In the western region fledging started about 10 days later and three small swarms developed of which one was destroyed.

It appears that Bahawalpur State, particularly its eastern part, received heavy rainfall at the same time as Eastern Rajasthan and breeding progressed in the two regions simultaneously during August. From the beginning of September six pink and two mixed swarms were noted coming into India near the Bikaner and Jaisalmer borders from the direction of Bahawalpur and Khairpur Mir's States. Two swarms (one pink and one mixed) came during October also. Two or three of these swarms were destroyed after they entered Bikaner area.

Late immigrant swarms and their breeding :

In the Kutch area which had remained free from breeding during July-August, hopper emergence was suddenly noted in the first fortnight of September as a result of egg-laying at the end of August. At this time the monsoon generation adults described above were hardly about one week old. In the beginning of September, three yellow swarms came into Barmer and the neighbouring parts of Jodhpur District from Western direction. A couple of swarms also entered Kutch from the adjoining Thar district of Sind at this time. About a dozen more swarms came into Barmer, Kutch, western parts of Jodhpur and Jaisalmer districts during September and a few of them during October. The vast majority of these swarms were fully mature (deep yellow) and immediately laid eggs. They flew into all the western districts of Rajasthan, Saurashtra, northern parts of Bombay State etc. A couple them flew straight to the Nagaur and Sikar districts in eastern Rajasthan and one even reached Hissar district. Recently they

have visited several cultivated areas of Rajasthan—3 or 4 of them have gone into Madhya Bharat and one crossing the Jhansi district of U.P. into Madhya Pradesh

The majority of late immigrant swarms being already fully mature, laid eggs in almost every area they visited as stated above. During September-October hopper emergences have been noted in several parts of Barmer, Jalore, Sirohi, Jodhpur, Nagaur districts of Jodhpur Division, Sikar, Jhunjhunu districts of Jaipur and the adjoining districts of Bikaner, Hissar (Punjab) and Mohindergarh (PEPSU) districts, Kutch, Saurashtra, Palanpur, Tharad and some northern districts of Bombay State, etc. The gross area infested so far is about 25,000 sq. miles. But this breeding is much more scattered than that during July-August in Rajasthan etc.

Second Generation Breeding :

The few small swarms which developed in Eastern Rajasthan as a result of monsoon breeding and the pink ones which came into Eastern Rajasthan from the Pakistan side became yellowish in the first fortnight of October. These swarms, however, soon got mixed with the late immigrant swarms which came from western direction. It is, therefore, difficult to distinguish the actual second generation from that of late immigrant swarms which started coming into India at the end of August. However, it is extremely doubtful, if many individuals of monsoon generation have actually got fully mature and in fact, many swarms at present contain grey individuals. This is in conformity with some previous laboratory observations in India when individuals which became adults at the end of August and during September did not reach maturity before the next spring.

Control Campaign during September-November:—

Control measures were immediately organised wherever hopper emergence was noted as a result of egg-laying by the late immigrant swarms. almost all the eastern districts in Rajasthan, Barmer and Jalore districts in western Rajasthan, Kutch, Saurashtra and some northern parts of Bombay State were cleared of hoppers by the beginning of November.

There was some breeding in the Sheikhavati area of Jaipur division, which was also controlled by the third week of November. In the Banas Kantha region of Bombay State breeding continued on a fairly large scale up to the end of November. Due to the paucity of labour and apathy of inhabitants of the tract, a number of hopper bands escaped destruction giving rise to a couple of swarms. They caused some damage in the neighbouring part of Bombay State as well and entered the Sirohi and Pali districts of Rajasthan where heavy breeding is reported. They reached Ajmer in the first week of December, and one of the swarms entered Jaipur District.

About the middle of December, a swarm was present in the Kutch area. This and the swarms referred to above are likely to get dispersed during the winter and die off. Some locusts may survive the winter in the warmer parts of the country.

CONCLUSIONS AND RECOMMENDATIONS OF THE INTERNATIONAL ANTI-LOCUST CONFERENCE HELD AT NEW DELHI FROM 6TH TO 11TH NOVEMBER, 1950

Under the Indo-Pakistan Iranian Convention, an International Anti-Locust Conference was held at New Delhi from 6th to 11th November, 1950. Some other governments interested in desert locust control had also been invited and about a dozen nations were represented at the Conference. The Locust situation in South West Asia, Arabia and Africa was reviewed. It was agreed that the situation was serious and that India was likely to be invaded on a much larger scale next summer. All the countries concerned agreed to make adequate preparation for locust control in their jurisdictions. It was also decided that India, Pakistan and Iran should assist in the control operations in Oman on the east Arabian coast, which is one of the sources of swarms for these countries. The conclusions and recommendations of the Conference on various matters are given below:—

The Conference has heard reports from the technical representatives of the Governments of India, Pakistan, Iran, Afghanistan, the United Kingdom, Iraq and U.S.S.R. regarding the desert locust situation during the past year and having reviewed plans for the ensuing year submits the following observations, conclusions and recommendations:—

1. Heavy and widespread winter-spring breeding took place in the coastal areas of western and southern Arabia and the Somalilands. This has been followed by widespread heavy summer breeding in the Anglo-Egyptian Sudan and adjacent territories. As a result, swarms have reached Algeria and Maurotania in the north-west and Kenya in the east.
2. In the eastern region, spring breeding took place in Pakistan and southern Persia. This was followed by intense monsoon breeding in the Indo-Pakistan deserts.
3. In spite of large scale control measures which were carried out in all territories, the desert locust plague assisted by exceptionally favourable weather conditions in the breeding areas has continued to spread in increasing intensity at a rate even greater than what had been expected whom warning was given a year ago.
4. The invasion of countries bordering on the Persian Gulf is in progress. Southern Persia and Trucial Oman were invaded by the middle of October, 1950.
5. Heavier breeding must be expected during next winter-spring in the territories bordering on the Persian Gulf, including also West Punjab and Afghanistan and also on Red Sea Coast. Swarms produced in the African-Arabian region may reinforce those produced in the Persian Gulf region and invasion of the monsoon breeding areas in Pakistan and India may be expected on a scale even greater than that experienced this year.

6. The situation is grave and the protection of vital food crops cannot be effected unless all territories concerned continue and intensify control measures on a scale substantially greater than what was possible this year.

(a) The Conference stresses that control measures in India during the next summer are likely to be required on a much greater scale. It takes note that in India, preparations are being considered to greatly increase the overall effort (Central and State).

(b) The Conference notes with satisfaction that in Pakistan, where breeding takes place both in spring and summer, plans have been prepared to increase the scope, mobility and effectiveness of the effort next year by additional staff, vehicles, helicopters and wireless equipment.

(c) The Conference has heard of the provision made for the reinforcement of the anti-locust organisation in Persia and notes with satisfaction that the financial provisions made for the ensuing year is on a scale which should prove adequate.

(d) The Conference stresses the necessity for the immediate implementation of the above by India, Pakistan and Iran.

(e) The Conference notes with satisfaction that the Desert Locust Control has, in consultation with the countries concerned in the East-African and Arabian region, prepared for the years October 1950—September, 1953, elaborate plans, on a three year basis, involving heavy financial outlay to combat the locust menace both in this region and in Oman. These plans are already being implemented. The Conference hopes that with this intensified effort on the part of the Desert Locust Control, the possibility of danger from this region to the countries on the Persian Gulf and to India and Pakistan will be lessened in the same way as the intensified control measures planned by Iran, Pakistan and India will lessen the danger to the Western region from the Eastern.

(f) The Conference has learnt that the invasion of the Oman Peninsula has already begun and that conditions there are suitable for breeding. The Conference observes that the Desert Locust Control has provided a team for the Oman and notes that the Nairobi Conference of July 1950 regarded this as inadequate to deal with heavy breeding should that occur. This was also the view of Pakistan and U.S.S.R. The Conference recognised the importance of locust breeding in the Oman but Iran and India feel that apart from the question of principle of the necessity of joint operations in that territory, there is no need for them to make a fresh contribution in cash or kind towards control operations during the current season. The Conference recommends

that the balance of funds and equipment (including one jeep and truck) left in the joint contribution actually made so far by Iran, India and Pakistan for 1950 should be made available to the Desert Locust Control to supplement the provision made by them for the current season.

7. The Conference noted that poison baiting was the chief method of Locust Control in Western countries and that this method was finding increasing use in Pakistan and Iran also. In India, however, the experience was different in as much as dusting was found to be more effective and also economical in view of the higher cost and scarcity of brans. U.S.S.R. delegates recommended that alongside with the baiting method, aerial dusting as the most effective method of control, should be adopted by all countries.

8. This Conference recommends that the fortnightly reports should be as full as possible and any information received too late for inclusion should be issued monthly in the form of supplementary reports.

9. In view of the widespread nature of the present plague the Conference recommends that steps should be taken to call a wider International Conference in the near future. Such a Conference should consist of technical experts from all the countries affected or threatened by the present plague. The Conference suggests that Egypt is most centrally placed for such a meeting and requests that this recommendation should be conveyed to the Royal Egyptian Government.

10. In view of the gravity of locust situation and the fact that locust control in the Iran-Pakistan-Indian region will check and reduce the intensity of this menace in all countries already affected or likely to be affected, this Conference recommends that the Food and Agricultural Organisation of the United Nations should be requested by the Government of India on behalf of the countries mentioned regarding India, Pakistan and Iran to explore the means whereby material assistance to this region from some appropriate international organisation, for fighting this pest might be made available. This material assistance might take the form of desert vehicles and control equipment such as machinery, insecticides etc.

11. That the Indo-Pakistan-Iranian Convention be renewed for a further period of 3 years.

12. The Conference has pleasure in recording its sincere thanks to the Government of India for its hospitality and for calling this Conference; in particular, it appreciates the many ways in which the officers of the Ministry of Agriculture have helped towards the smoothness of its proceedings.

SOME NEW DISEASES OF PLANTS OF ECONOMIC IMPORTANCE IN THE UTTAR PRADESH

By

P. R. Mehta,

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LEAF SPOT DISEASE OF WHEAT caused by *Alternaria* sp.—In the culture collection of the different wheat varieties of the U. P., grown at the Research Farm, Kanpur, some varieties were badly affected with a leaf spot disease. The spotting was so extensive and severe that the leaves dried up prematurely and the yield was considerably reduced. The disease was confined only to 'Durum' wheat varieties, viz., *Jansi*, C. P., Bansipalli 808, and others. These varieties are extensively grown in the Bundelkhand (trans-Jamuna area) area. Enquiries were made from this area and it was noted that the disease is prevalent there.

Isolations from the lesions always gave a culture of *Alternaria* sp. Inoculations of Durum varieties with pure cultures of the fungus were always successful, and typical symptoms developed in 4-6 days. There are indications that the disease is seed-borne.

POWDERY MILDEW OF 'BER' (*Zizyphus jujuba* L.) caused by *Oidiopsis* sp.

This disease was noted at Kanpur in 1946. It is reported that the disease is widely distributed in the U.P. The damage, however, appears to be more severe in the western U.P. The disease appears in the month of November. The affected young fruits turn brown and are shed. The disease disappears in April. There are indications that the mycelium hibernates in the new shoots which arise every year in the month of February. The disease was successfully controlled in an orchard by one dusting with sulphur in the month of December. This operation was carried out by the Plant Protection Services of the U.P.

ZONATE LEAF SPOT OF 'JOWAR' (*Sorghum vulgare* L.) caused by *Gloeocercospora sorghi* Edgerton and Bain.—This disease appears to be widely distributed in the U.P. The symptoms are identical with those described from the U.S.A.

FRUIT-SPOT AND FRUIT-ROT OF PAPAYA (*Carica papaya*) caused by *Colletotrichum* spp.—Two species of *Colletotrichum* seem to be associated with fruit-spot and fruit-rot of papaya in the U.P. One species has oval or cylindrical spores with rounded ends and the other has falcate spores. Infection by the former results in sunken, watery spots, and by the latter in black, leathery, erumpent spots. Green and semi-ripe fruit have been successfully inoculated by pouring spore suspension on the uninjured surface of the fruit.

FRUIT-SPOT OF PAPAYA (*Carica papaya*) caused by *Cephaleuros virescens*.—This disease appears to be widely prevalent in the U.P. The damage is negligible, but the spotting reduces the market value of the fruit.

WILT OF GUAVA (*Psidium guajava*) : This disease was reported from the U.P. a few years back. It has now assumed serious proportions. The disease occurs commonly in the eastern districts of U. P. Species of *Cephalosporium* and *Fusarium* have been isolated from wilted plants. The disease is under investigation.

CHESTNUT BLIGHT.—Gupta (Cur. Sci. 19 : 13-14; 1950) reported the occurrence of chestnut blight, caused by *Endothia parasitica* And. and And. in the Kumaon Hills.

VARIETAL RESISTANCE OF THE BARLEY VARIETIES TO COVERED SMUT.—The varietal resistance of the following barley varieties, commonly grown in the U.P., was tested against a collection of covered smut from Kanpur.

Reaction	Variety
Susceptible	NP. 21, C. 251, CN. 292
Moderately resistant	C. 86, C. 50
Resistant	C. 84, CN. 294.

JAPANESE GOVERNMENT PLANT QUARANTINE REGULATIONS (QUARANTINE OF IMPORTED PLANTS)

The Japanese Government have promulgated a Plant Quarantine Law which has been enforced by an Ordinance with effect from August 20, 1948.

Restrictions on importation of Plants :—According to the Plant Quarantine Regulation, all plants specified in an ordinance and referred to as "designated plants", living plants, living cut flowers, grafts, scions, cuttings, bedding plants, roots, stalks, leaves or any part of a plant, bulbs, seeds except soy-bean of Manchuria and cereals to be used as foods, fresh fruits exclusive of raw chestnut produced in China or Korea and pineapples, shall not be imported into Japan without being accompanied by a certificate of inspection issued by a proper authority of an exporting country stating to the effect that the said authority has acknowledged or believed that the plants are not infected with plant diseases or injurious insects.

Prohibition of importation of Plants :—Further, in order to prevent entry of plant diseases or injurious insects, no person shall import any of items referred to as 'prohibited articles' such as :

(i) plants prohibited by the ordinance which have been shipped from, or have passed through, districts prohibited by the ordinance (See annexed table),

(ii) plant diseases or injurious insects,

(iii) soil or plant with soil.

Restriction over place of entry.—Any person, who wishes to import any of prohibited plants or articles shall not import the same at the places other than specified ports of entry or air-fields.

Inspection of imports:—Any person, who has imported prohibited plants or articles, shall without delay submit the same and the packages or packing materials thereof for inspection by the plant quarantine official.

Imports through Mail :—In case any person wishes to import through mail the prohibited plants or articles, he shall not import the same in any form other than small packet sample or postal parcel.

Any person, who has received mail matter imported in violation of the above shall without delay report to that effect to the Animal and Plant Quarantine Station submitting such mail matter.

On-the-spot Inspection :—If any ship, vessel, train, airplane, warehouse, or other place carries stores or possesses or is suspected of carrying, storing or possessing the prohibited plants or articles, or other

imported articles which are suspected of being infected with plant diseases or injurious insects, the plant quarantine official may inspect such prohibited plants or articles, or others on board the ship, train or airplane, or in such warehouse or other place, or examine the person concerned or inspect the articles possessed by the persons concerned.

Measures to be taken on the basis of Inspection :—Plant Quarantine Official may, upon inspection, sterilize or destroy a plant or other article determined to have been infected with plant diseases or injurious insects, or prohibit the same from being received, or take other necessary measures.

No person may receive any article imported in violation of the above regulations or articles which underwent no inspection as required by the Plant Quarantine Law.

Method of inspection and standard of measures to be taken.—The method of inspection, standard of measures to be taken in consequence of the inspection, and other particulars necessary for inspection shall be determined by the Minister of Agriculture and Forestry.

Table of prohibited districts and plants.

Prohibited districts	Prohibited plants	Pest to be prevented.
1. French Indo-China, Tai, Malay, Burma, *India*, Palestine, Syria, Turkey, Cyprus, Greece, Italy, France, Germany, Switzerland, Malta, Spain, Portugal, Africa, Bermuda, West Indies, Venezuela, Brazil, Uruguay, Argentine, Hawaii, Australia, New Zealand.	Fresh fruits, (excluding pineapples).	Mediterranean fruit fly (*Ceratitis capitata* Wied.).
2. South-Western Islands south of north latitude 30 degrees, Formosa, South sea Islands, China, Hong Kong, Philippine Islands, French IndoChina, Tai, Malay, Borneo, Celebes, Java, Sumatra, Other Islands of the Malay Archipelago, Burma, *India*, Ceylon, Kenya, Hawaii, New Guinea.	Fresh fruits of cucumbers, water-melons, muskmelons, squashes, other cucurbitaceous plants, tomatoes, Kidney beans, and cowpeas.	Melon fly (*Chaetodacus cucurbitae* Coq.).
3. Union of Soviet Socialist Republics, China, Hong Kong, Burma, *India*, Iran, Afghanistan, Iraq, Palestine, Cyprus, Europe, Africa, Canada, America, Brazil, Uruguay, Argentine, Chile, Peru, Australia, New Zealand.	Fresh fruits of apples, pears, quinces, peaches, plums, apricots, cherries and fresh fruits of walnuts and whole walnuts in a shell.	Codling moth (*Grapholitha pomonella* L.).

Table of prohibited districts and plants—contd.

Prohibited districts	Prohibited plants	Pest to be prevented
4. Bonin Islands, Iwo Islands, South-Western Islands south of north Latitude 30 degrees, China, Hongkong, Philippine Islands, French Indo-China, Tai, Malay, Borneo, Celebes, Jaa, Sumatra, other Islands ofvthe Malay Archipelago, Burma, *India*, Ceylon, Australia.	Fresh fruits of citrus, loquats, persimons, plums, peaches, mangoes, papayas, logans, litchies, coromandel, gooseberries, rose apples, Malay apples, guavas, bread fruits, jack-tree, *Garcinia spicata*, avocado, pears, *Erenga Engbri*, *Solanum verbacifolium*, Brazil cherries, Anona plants, Capsicums, betelnuts and mature bananas.	
5. Bonin Islands, Iwo Islands, South-Western Islands, south of north latitude 30 degrees, Formosa, South sea Islands, China, Hongkong, Philippine Islands, French Indo-China, Tai, Malay, Borneo, Celebes, Java, Sumatra, Other Islands of the Malay Archipelgo, Burma, *India*, Ceylon, Africa, America, West Indies, Guiana, Oceania.	Tubers of sweet potatoes ..	Sweet potato weevil (*Cylas formicarius* Fabr.), sweet potato moth (*Omphisa anastomosalis* Guen.), *Euscepes postfasciatus* Fairm.
6. Java, Burma, *India*, Cyprus, Europe, Africa, North America, South America, Hawaii, Guam, Australia, New Zealand.	Potatoes, egg-plants, tomatoes, capsicums and other Solanaceous plants and their fruits and tubers.	Potato wart disease or potato canker (*Synchytrium endobioticum* Per.), Powdery scale of potato (*Spongospor subterranea* Lagihein), Ring rot of potato (*Bacterium sepedonicum* Spieck), Potato tuber moth (*Phthorimaea operculella* Zell.), Colorado potato beetle (*Leptinotarsa decemlineata* Say).
7. Union of Soviet Socialist Republics, Iran, Asia Minor, Europe, North-America, New Zealand.	Straws of wheat, barley Oat and rye. (including straw-wrapper, straw-matting and other mattings for packing purposes).	Hessian fly (*Phytophaga destructor* Say).
8. China	Fresh fruits of apples, other Malus and Crataegus plants.	Manchurian apple moth (*Grapholitha inopinata* Hein).

AN AMENDMENT TO SECTION 13 OF THE NURSERY STOCK, PLANT AND SEED REGULATIONS, UNITED STATES DEPARTMENT OF AGRICULTURE, APPROVED MARCH 16, 1950

The revised rule requires that restricted plant material including bulbs from countries with official systems of inspection must be accompanied by a certificate issued by a duly authorised official of the country of export stating (1) the country where the restricted plant material covered by the certificate was grown, (2) that it was grown on land where no golden nematode occurs, (3) that it has been thoroughly inspected by him or under his direction, both during the growing season and at the time of packing and was found and believed to be free from plant pests, (4) that it is free from all sand, soil or earth and (5) that only approved packing materials have been used.

When the material is from a country where the golden nematode is reported to occur, the certificate must in addition state the date of the most recent inspection of land on which the material was grown.

This amendment also requires that when restricted plant material was not produced in the country from which it is shipped to the United States, the certificate must be issued by an official in the country where such material was grown.

Each certificate or copy certificate accompanying all shipments must contain this information.

SUMMARY OF REPORT OF PHYTOSANITARY CONFERENCE HELD AT SINGAPORE FROM APRIL 26TH TO 28TH, 1949

Acting on a suggestion from His Majesty's Government in the United Kingdom, the Commissioner-General for the United Kingdom in South East Asia organised a meeting of a Technical Committee, on Plant Protection. This Technical Committee consisting of representatives of the Governments of India, Indo-China, Indonesia, the Federation of Malaya and Singapore and observers from the Government of the United States of America and the Food and Agriculture Organisation of the United Nations, met at Singapore on February 22nd and 23rd, 1949.

The Technical Committee recommended that a Phyto-Sanitary Conference should be called to discuss the whole problem of plant protection in South East Asia. The Conference was held at Singapore and made the following recommendations:—

(1) that a Phyto-Sanitary Convention should be convened to be known as South East Asia and Pacific Phyto-Sanitary Convention;

(2) that the region covered by the Convention should be Brunei, Burma, Ceylon, China (southern provinces), Fiji, Hong-Kong, India, Indo-China, Indonesia, Federation of Malaya, New Caledonia, Trust Territory of New Guinea, North Borneo, Pakistan, Papua, Philippines, Portuguese Timor, Sarawak, Siam, Singapore, Western Samoa and those islands in the Pacific Ocean bounded by Lat. 30°N and 30°S. and long. 140°E. and 150°W.

(3) that all plant material especially that used for the propagation of plants and responsible for the spread of pests and diseases should come within the scope of the convention;

(4) that the Commission should among its other duties be advisory in character and be responsible for the collection and collation of information on the phyto-sanitary legislation at present in force in all the territories concerned and administrative measures in force dealing with plant imports;

(5) that provision should be made for establishment of a Centre of Information on the distribution and control of plant pests and diseases;

(6) each country should compile a list of major plant pests and diseases, the introduction of which would constitute a serious menace to the South East Asia and Pacific Region and the view was expressed that specimens upon which new records of pests and diseases are based should be preserved;

(7) that each country should establish its own quarantine stations but that potentially dangerous material should be subject to intermediate quarantine outside the region covered by the Convention;

(8) that in view of the extensive territory and diversity of conditions in the region covered by the Convention, there should be sub-regional technical committees responsible for the co-ordination of the phytosanitary work in each sub-region;

(9) that all Governments should be consulted and their approval taken regarding the draft for a Phyto-Sanitary Convention, for effecting a co-ordinated and concerted action against plant pests and diseases; to take all quarantine safeguards; to set up a Permanent Advisory Commission comprising one representative of each of the signatory powers; to appoint a scientific secretary to such commission ; to establish in London a permanent Centre of Information comprising the British Commonwealth Institutes of Entomology and Mycology ; that with a few exceptions all official correspondence shall be conducted between the Secretary of the Commission and the signatory powers and to contribute in proportions to be agreed upon towards the cost of the Secretariat of the Commission and the activities of Centre of Information ;

(10) the Convention stressed the desirability of co-operating with the Food and Agriculture Organisation of the United Nations and with the South Pacific Commission in Phytosanitary work in the South East Asia and Pacific Region;

(11) that the signatory Governments should be asked to make regulations prohibiting the carriage to, from or through their territory in the region of any living plant or planting material (normally excluding fruit or vegetables for consumption in the aircraft) unless accompanied or covered by a permit issued by the competent authority in the country of destination;

(12) in view of the urgency of enacting measures to exclude South American Leaf Blight of Hevea rubber (*Dothidella ulei*) from the South East Asia and Pacific Region the Conference recommended that the regulations which follow should be immediately brought to the notice of the Governments of all countries in the region and that the Governments be asked to embody the substance of the regulations in their phytosanitary legislation with the least delay possible and draft Regulations for the control of traffic in plants emanating from Tropical America; and

(13) regulation prohibiting the importation of cocoa plants and all plants known to be hosts of the cocoa swollen shoot virus be drafted for inclusion in the phytosanitary legislation of all countries within the region, as the virus has caused devastating damage to cocoa in West Africa.

PLANT PROTECTION NOTES AND NEWS

ROOT-DESTROYING WORMS KILLED THROUGH FUMIGATION

American farmers are now using certain chemicals called Nematocides to kill nematodes which attack and destroy roots of plants and cause "soil sickness". These chemicals are derived from Petroleum and have proved remarkably effective against the tiny pests. These nematodes are prolific breeders, each of which is capable potentially of producing 10,000 young in 90 days and a single plant may be attacked by as many as 6,000,000 worms. They may inject enzymes, into plant upsetting its metabolism or they may cause nutritional deficiency by sucking vital elements from plant cells, according to Dr. Chitwood.

A nematocide when used with due care and skill, permeates the soil by means of gas pressure (which should be carefully regulated, so that it is neither too high nor too low and with relation to the existing temperature).

There are several nematocide products which suit different farm conditions. Chloropicrin, methyl bromide, dichloropropene, ethylene dibromide, allyl bromide, dichlorobutene, chlorobromopropene and mixtures of these with other substances are some of the Nematocides on the market.

[Extract from: "*American Newsfile*" *Agriculture Supplement*, 50-A-22, November 22, 1950.]

TOMATO INSECT STUDIES

The use of DDT and DDD in the tomato insect control programme has resulted in excellent control of caterpillars attacking tomato without apparently resulting in any serious complications that tend to restrict their use.

Excellent control was obtained with not more than three properly timed and thoroughly applied treatments. In numerous cases satisfactory control was obtained with two well timed applications.

Because DDD is more effective than DDT in controlling the tomato hornworm, it was used more extensively wherever the tomato hornworm threatened serious damage.

Through application of either 5 per cent DDT or 5 per cent DDD dust at the rate of 30 pounds to an acre brings excellent result. To insure control of the tomato mite, these materials should be user with no less than 50 per cent sulphur. If there is no tomato mite (by September) sulphur can be omitted after first application.

Timing of applications will vary somewhat according to the season and place.

(Extract from: "*California Agriculture*", Vol. 4. No. 5 pp. 11-12)

"FATAL RESULTS TO HUMANS FROM THE USE OF POISONOUS INSECTICIDES : WARNING BY A WELL KNOWN PHYSICIAN"

Dinitro-ortho-cresol (DNOC) and diethyl-para-nitro phenyl thiophosphate (Parathion) are both used for crop protection and in factories, green houses, orchards, as weed killers, insecticides, ovicides and fungicides. Strict precautions are necessary to protect the workers engaged in handling these new insecticides, because they are deadly in their effects upon man. Several bitter experiences have come to light wherein toxic symptoms, serve intoxications and several deaths occurred in various countries, of persons engaged in manufacturing and use of DNP and DNOC.

Fatal cases in industry have occurred invariably during hot-weather. DNOC is absorbed through the skin by ingestion or by inhalation of the dust, spray or vapour. Breathing in of fine dust readily produces symptoms. Early symptoms of DNOC poisoning are excessive thirst, sweating and loss of weight.

Parathion which is commonly used against insects such as aphids, red spider etc., is an organic compound containing phosphorus and preparations in common use contain (tetraethyl pyropho phate, Hexaethyl tetra phosphate (HETP), and diethyl—para—nitrophenyl thiophosphate (Parathion, E 605 f. DPTF or bladon) and these are poisonous to man and animals. Even an exposure to as little as 0.3g. daily is dangerous to man, it is estimated.

All types of preparation of parathion penetrate skin rapidly producing slight irritation at the site of absorption and death may result within an hour of the onset of symptoms, which are headache, giddiness, nausea and vomiting.

[Extract of "Poison Sprays" by Lady Howard—*Health and the Soil*, Summer-Autumn, 1950.]

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